



## **Analysis of CONSERT direct range measurement in Rosetta mission as a testbed for future small body in-situ lander-orbiter navigation**

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In recent small body exploration missions, both landers and orbiters are deployed and operate simultaneously, such as Hayabusa-2, Rosetta mission. With a lightweight transponder on the lander, it is possible to implement tracking session between the lander and the orbiter, which permits to the automatic navigation of the orbiter and could improve the accuracy of the lander position determination. As a testbed, we analyzed the direct range data acquired from CONSERT (Comet Nucleus Sounding Experiment by Radiowave Transmission) experiment between the Philae lander and Rosetta orbiter during the so-called FSS (First Science Sequence) period. With the classical orbit determination method and a high precise Philae lander position ( $\pm 2\text{m}$ ), pinned from the OSIRIS image, we try to constrain the Rosetta orbit and the GM of comet 67P/Churyumov-Gerasimenko. The work here could supply a reference for future small body exploration with automatic navigation.